



CURRICULUM

MATHEMATICS 15&25

IM GUIDE - 1982

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Mathematics 15/25 Development Committee 1979-80

Mr. Wilf Lencucha, Consultant, Alberta Education, Chairman
Mr. Richard Daly, Consultant, Alberta Education
Mr. Bruce Stonell, Consultant, Alberta Education
Mr. Garry Popowich, Associate Director of Curriculum

Mathematics 15/25 Program and Learning Resources Committee 1981

Mr. Bruce Stonell, Consultant, Alberta Education, Chairman
Mrs. Thelma Baumgarten, Teacher, County of Strathcona No. 20
Mr. Wayne Brenna, Dept. Head, Red Deer Public School
District No. 104
Mr. P. J. Clooney, Teacher, Edmonton Public School District No. 7
Ms. Carol Duffin, Teacher, County of Parkland No. 31
Mr. Hilgar Fast, Teacher, Calgary Public School Board
Mr. Walter Hubick, Teacher, Edmonton Separate School Board
Ms. Marlene Jones, Teacher, Calgary Separate School Board
Mr. Joseph Kieser, Teacher, Sturgeon School Division No. 24
Ms. Judith Loose, Teacher, Calgary Separate School Board
Mr. Herb Specht, Teacher, Camrose School District No. 1315
Mr. Garry Popowich, Associate Director of Curriculum

Learning Resource Officer: Rod E. McConnell

Editor: Lisa McCardle

Artist: Shih-Chien Chen

Typists: Marie Deangelis
Sylvia Baker

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NOTE: This publication is a service document. The advice and direction offered is suggestive except where it duplicates or paraphrases the contents of the Program of Studies. In these instances, the content is color coded yellow in the same distinctive manner as this notice so that the reader may readily identify all prescriptive statements or segments of the document.



MATHEMATICS 15-25 GOALS

1. To develop in students a background in basic mathematics required in daily life situations
2. To assist students in developing problem solving techniques which are applicable to a variety of life situations
3. To revitalize the students' interest in mathematics through successful experiences at the students' level of understanding
4. To develop in students a knowledge of the development of mathematics, its application in our world both past and present and toward the future

MATHEMATICS 15-25 PROGRAM RATIONALE

RATIONALE

A strong foundation in the area of mathematics is important in the lives of young people. This would suggest that a diversified range of mathematics programs be available to suit the wide variety of abilities, interests and needs apparent in our high school students. Mathematics 15-25 is developed primarily to provide for approximately 25 to 35 percent of our student population who require high school credits in mathematics but have experienced frustration and difficulty in learning mathematics in the past. The program is not intended as a remedial program although it may be necessary to review and reinforce concepts and skills developed over preceding years.

Many of the students who enrol in this program possess the ability to achieve but may lack the motivation or interest to succeed to their fullest capacity. It is the responsibility of each teacher to arouse the student's interest and adjust the program to meet individual needs. The program should be success oriented, student centered and experiential. It should provide for a problem-solving approach, relying on applications that come in part from the student's knowledge and experience in the real world and should also make use of materials and activities to which the student can personally relate. For this reason, a core-elective program is provided with sufficient flexibility to meet these aims.

MATHEMATICS 15 — OVERVIEW

Suggested
Time
Allocation

60%

Core

- A. Number System (Whole Numbers, Decimals, Fractions, Positive and Negative Numbers)
 - 1. Estimation
 - 2. Place Value
 - 3. Basic Operations
 - 4. Order of Operations
- B. Measurement
 - 1. Metric Measure
 - 2. Length, Area, Volume, Capacity, Mass, Pressure, Temperature
- C. Ratio and Rate
 - 1. Ratio and Equivalence
 - 2. Rate
 - 3. Percent
- D. Data Presentation
 - 1. Analysis of Data
 - 2. Tabulation of Data
 - 3. Construction of Graphs
- E. Algebra - Solving of Simple Equations
 - 1. Concept of an Expression
 - 2. Evaluation of Expressions
 - 3. Words and Algebraic Expressions
 - 4. Solution of Simple Equations In One Variable
 - 5. Simple Word Problems

Suggested
Time
Allocation

40%

Elective

A. Consumer Topics

1. Banking Services
2. Personal Salaries and Operating Costs
3. The Automobile
4. Budgeting
5. Travel and Recreation

B. Others

- E.g.,
1. Calculator Literacy
 2. History of Measurement
 3. Computer Literacy
 4. Pythagorean Theorem & Similar Triangles
 5. Graphing on a Coordinate Grid



MATHEMATICS 25 — OVERVIEW

Time Allotment

60%

Core

A. Number Systems - Review

1. Whole Numbers
2. Integers-concepts, order and operations
3. Rational Numbers (Decimals, Fractions, - concept, order, and operations)
4. Percent

B. Algebra

1. Equations - operations with equations

C. Data Presentation

1. Data Organization
2. Frequency Tables
3. Graphical Forms
4. Mean, median, mode

D. Life Skills

1. Earning Money
2. Income Tax
3. Money Management

40%

Electives

A. Consumer Topics

1. Insurance
2. Taxation
3. Loans and Financing
4. Investments
5. Travel and Recreation

B. Geometry

1. Concepts and Terminology - Angles, triangles, parallel lines and polygons (related terms and concepts associated with each)
2. Measurements
3. Constructions
4. Prisms & Pyramids
5. Trigonometry
6. Pythagorean Theorem

C. Powers and Roots

1. Laws of indices
2. Calculation with power and roots
3. Scientific Notation

D. Probability

1. Probabilities, chance, prediction
2. Rules
3. Odds
4. Events

E. Motion Geometry

1. Terminology
2. Translations, reflections, rotations and dilations
3. Constructions
4. Symmetry and Congruency

F. Other

1. Calculator Literacy
2. Computer Literacy



GUIDANCE

Mathematics 15-25 is a terminal mathematics program which accommodates the diploma students and/or those students who have experienced frustration and difficulty in learning mathematics. A major goal of this program is to attempt to develop in this particular group of students a basic background in mathematics to assist them in dealing with mathematics in daily life situations. The Mathematics 15-25 program is not a pre-requisite for attendance at technical schools or for enrollment in the Apprenticeship Training Program, but does assist students in preparation for apprenticeship training.

To be accepted in the Apprenticeship Training Program a student must be sixteen years of age and must have completed a basic minimum of education (completion of grade 9, 10, or 11) depending on the trade chosen. Mathematics 15-25 is generally not acceptable for trades requiring algebra and trigonometry. Students contemplating entry into trade courses are encouraged to study the trigonometry unit within the Mathematics 25 Geometry elective, and the Math 25 Power and Roots elective (being piloted during the 1981-82 school term).

An apprenticeship candidate may be required to write a prescribed entrance examination if there is any doubt regarding his mathematical level, or if the particular trade chosen requires an entrance exam. In the event of failure the candidate is encouraged to upgrade by applying for a pre-apprenticeship class, a correspondence course or an appropriate evening class.

Although completion of both Mathematics 15 and Mathematics 25 is desirable, pre-apprenticeship upgrading can accommodate individuals with incomplete grade 9 or lower levels of education.

CORE-ELECTIVE PROGRAM

The program is designed for approximately 60% of the instructional time available to be devoted to the core component with the elective component comprising the remainder. Both core and elective are mandatory components of the program.

The core aspect of the program is, in part, a sequential development or a review of the mathematics studied in previous years. It should provide the student with mathematics skills required in everyday life. The core is not detailed specifically, as a variation in student ability, and knowledge of mathematics will be present. Teachers should be flexible in dealing with the content of the core topics, the methodologies to be used and the breadth and depth of study undertaken so that the program may be more adequately adapted to meet the specific needs of the students.

The elective units may be used to extend core topics or to deal with mathematical topics and applications that are of special interest to students. These may include consumer topics, computer/calculator applications, history of mathematics and others that have been developed locally.

PROBLEM SOLVING

Problem solving is considered as one of the major goals of mathematics education. The ability to meet and solve the countless problems that arise in many subject areas and avenues of living is a fundamental skill of the schooling process.

It may be recognized that certain forms of problem solving occur as a result of creative thinking. A more important form of problem solving in mathematics involves the development of a systematic and logical approach to deal with an unfamiliar situation in which no algorithmic solution is available. To develop this important ability involves the development and knowledge of certain process skills which the individual may draw upon to seek a solution. Problem solving crosses the disciplines and is fundamental to decision making.

The term common to this subject is "heuristic" meaning to discover. Heuristic is the science of discovery. Some refer to it as a strategy for teaching and learning. Heuristics is better identified as a collection of techniques for discovering solutions to problems. Many techniques are fundamental in the learning process of mathematics. What is important is the method of solution. Heuristics directs attention to the methodology which, in other words, indicates the "working process".

As in other skills, process is considered essential in problem solving and must be emphasized and practised frequently. (Refer to the Appendix section for a descriptive list of problem solving steps and strategies.)

DATA PRESENTATION AND STATISTICS

Statistics and probability have become an important part of everyday life. Decisions based on predictions made by statistical analysis are far reaching. Students should be made aware of the impact of interpretation of statistics. Weather forecasting, television programming, betting odds, and pre-election polls are affected by the collection of data. The study of elementary statistics should aid students in observing, analysing and interpreting data. Demonstrating that data is interpreted differently, and perhaps in contradiction, underlines the importance of teaching students to examine data before interpreting results. Interpretation does not require advanced mathematical study or knowledge. Students can learn to predict subsequent results by examining statistics on a regular basis.



APPLICATIONS

Mathematics, to be interesting and meaningful, must emphasize the application of mathematical skills and concepts to solve problems that are an everyday part of our life in society. Students should understand the interrelationships that exist between life problems and the mathematics program, and be able to use their skills to find the solution to new problems as they arise.

Applications, like problems solving, should be integrated into the overall program rather than be dealt with as an independent unit. Whenever possible, integration and coordination with other subject areas is important. When the area of applications becomes extensive or complicated in relation to computational skills, the use of the calculator may become a necessary component of the learning process to avoid time-consuming calculations and a lack of motivation resulting from the drudgery of the activity.

In searching for applications, teachers should identify sources of relevant applications in the community including the home, local industry and occupations and environmental sources. The use of real life applications not only will provide an awareness of problems within society but also is purposeful as a context within which to develop a more thorough understanding of mathematics.

Applications are important in unifying a variety of mathematical concepts in the program and should be considered as a necessary component of any unit of study.

CALCULATORS

"I have always endeavoured according to my strength and the measure of my ability to do away with the difficulty and tediousness of calculations, the irksomeness of which is wont to deter very many from the study of mathematics".

John Napier
From the Dedication of Rabdologiae

The calculator has become a fundamental instrument used in countless areas of human endeavor. The calculator should be considered not only as a computing instrument but also as an important teaching device. If used properly, the calculator will allow for the development of new instructional strategies and for students to focus on mathematical concepts and processes. The calculator is not a replacement for basic calculation or mental arithmetic which the human brain can do more quickly. However, when used in a proper manner the calculator can adequately reinforce basic skills and concepts, remove most of the drudgery for computation, allow for a more rapid solution of complex problems and eventually add new strategies for the instructional process.

Alberta Education encourages the use of calculators in mathematics instruction. Their use can be justified by the following statements which were adapted from the list established by the National Council of Teachers of Mathematics Instructional Affairs Committee.

- The calculator can be used to encourage students to be inquisitive and creative as they experiment with mathematical ideas.
- The calculator can be used as an aid to assist the individual in making wise consumer decisions.
- The calculator can be used to reinforce the learning of the basic number facts and numeration concepts.
- The calculator can be used to develop or reinforce the understanding of computational algorithms and other mathematical properties.
- The calculator can be used to serve as a flexible tool to enhance estimation skills in computation.
- The calculator can be used as a resource tool that promotes student independence in problem solving.

- The calculator can be used to formulate generalizations from patterns of numbers that are displayed.
- The calculator can be used to decrease time taken to do lengthy calculations. Time and energy can then be redirected to the processes needed to solve difficult computations and problems.

Opportunity for extended use of the calculator in the Mathematics 15-25 program is provided in the elective unit on Calculator Literacy.

Teachers are also reminded of the *"Guidelines For The Use of Calculators, 1-12"* available from Alberta Education.



COMPUTERS

With the increasing use of computers in society it is appropriate that all students become computer literate.

"Computer literacy is an essential outcome of contemporary education. Mathematics Programs must take full advantage of the power of computers at all grade levels." (NCTM, 1981)

"Each student should acquire an understanding of the versatility and limitations of the computer, and a working knowledge of how one interacts with computers through first hand experiences." (NCTM, 1981).

Many areas within the Mathematic 15-25 program might involve the use of computers. Courseware is available for developing skills in problem solving, simulation, drill and practice programs, and lessons that introduce and develop concepts. Some classes may wish to become involved in some programming.

The implementation of a program involving computers will depend upon local conditions, especially the resources of the community, the computer facilities available to the school, and the degree of teacher expertise.



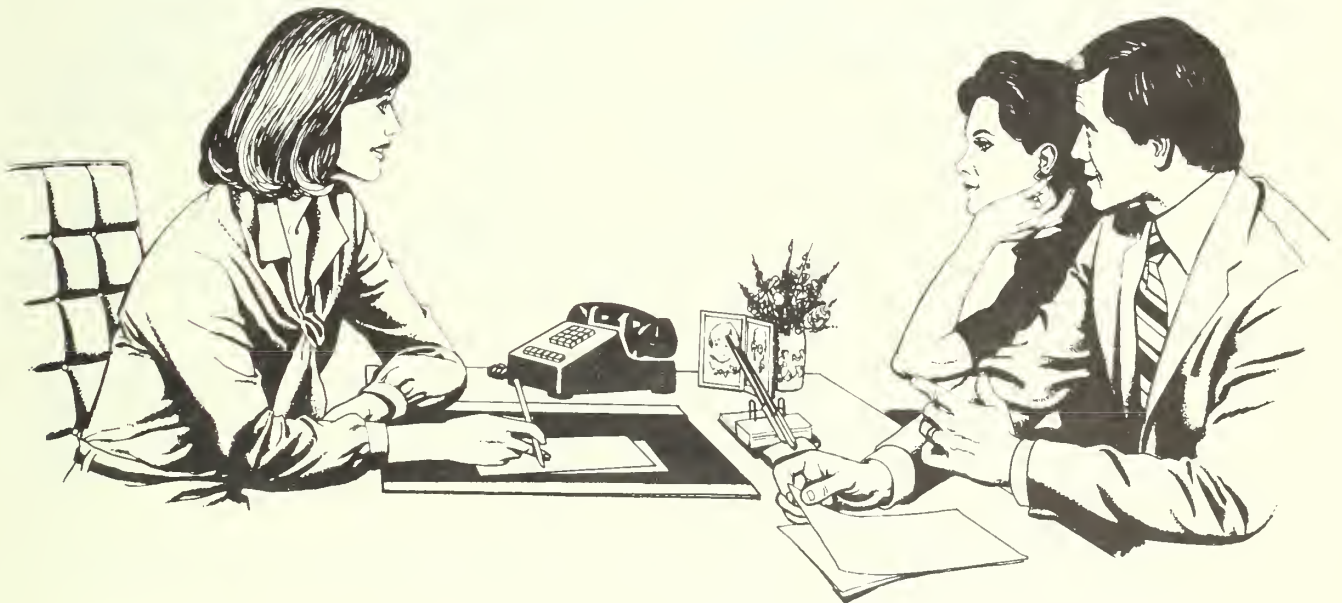
EVALUATION

The program being success oriented, student centered, and experiential, should be evaluated by a wider range of measures than conventional testing. A vital part of student evaluation should include daily assignments, projects, laboratory activities, and work sheets. Student attitude and effort might also be considered as additional evaluative criteria.

A full range of the program goals, including skills, problem solving and problem solving process should be included in the evaluation of mathematics learning.

In a student evaluation system for a success oriented program, it is essential that the marking system provide communication of the results of frequent evaluation in the shortest possible time. In addition to assigning grades, the system can be useful in motivating students and improving instruction.

The above ideas on evaluation should be adapted to, and consistent with the evaluation policy of the school and/or school jurisdiction.



TEXTS & REFERENCES

PRESCRIBED LEARNING RESOURCES

MATH 15:

Bolster, L.C., Woodburn, H.D.,
Mathematics in Life, Toronto: Gage
Educational Publishing Ltd., 1978

Hayden, M.P., Wells, D.W., et al
Mathematics for Daily Use, Toronto: Doubleday
Canada Ltd., 1980

Shaw, B.R., Denholme, R.A., Shelton, G.H.,
Mathematics Plus, Toronto: Houghton Mifflin, 1979

MATH 25:

Bolster, L.C., Woodburn, H.D., Gipson, J.H.,
Consumer & Career Mathematics, Toronto: Gage, 1980

Cutting, R.J., et al
Math You Need (Book 2), Scarborough, Nelson
Canada Ltd., 1981

LEARNING RESOURCE APPROVALS

In terms of provincial policy, learning resources are those print, nonprint and electronic courseware materials used by teachers or students to facilitate teaching and learning.

PRESCRIBED LEARNING RESOURCES are those learning resources approved by the Minister as being most appropriate for meeting the majority of goals and objectives for courses, or substantial components of courses, outlined in provincial Programs of Study.

RECOMMENDED LEARNING RESOURCES are those learning resources approved by Alberta Education because they complement Prescribed Learning Resources by making an important contribution to the attainment of one or more of the major goals of courses outlined in the provincial Programs of Study.

SUPPLEMENTARY LEARNING RESOURCES are those additional learning resources identified by teachers, school boards or Alberta Education to support courses outlined in the provincial Programs of Study by reinforcing or enriching the learning experience.



MATHEMATICS 15

A. Number System

Section A should be considered as a review for most students, and consideration should be given to the use of calculators in the development of concepts and skills.

PREVIOUS NUMBER SKILLS

<u>TOPICS</u>	<u>APPLICATIONS</u>
1. Estimation and Reasonableness of Answers - In computation as well as problem solving	1. Use of calculators 2. Vacation costs, living costs, education costs and benefits, building costs, repair costs 3. Problem solving skills 4. Games
2. Place Value - Multiplication and division - Powers of 10	1. Relation to metric system 2. Money notation 3. Writing cheques
3. Basic Operations - Whole numbers - Decimals - Positive and negative numbers - Single fractions	1. Living expenses - food, bills, rent, car payments, etc. 2. Banking services - deposit slips, cheques and balances 3. Insurance policies - homeowner, car, life 4. Income tax, monthly statements

TOPICS

4. Order of Operations
 - Four basic operations
 - Use of parentheses
 - Application of the commutative, associative and distributive properties
 - Use of zero and one (concentrate on whole numbers for instructional purposes)

APPLICATIONS

1. Shortcuts in calculations
2. Math skill testing questions on cereal boxes, etc.

B. Measurement

TOPICS

1. Metric Measure
 - Selection of appropriate units

2. Length
 - mm, cm, m, km
 - Selection of appropriate units
 - Estimation
 - Measurement
 - Concept of and formulas for perimeter
 - Measuring instruments - ruler, trundle wheel, clippers, micrometer, odometer
 - Conversion - equivalent units within the SI system
 - Application to real world

3. Area
 - mm^2 , cm^2 , m^2 , km^2 , hectare
 - Selection of appropriate units
 - Estimation
 - Measurement-using a grid, calculation, formula
 - Conversion-equivalent units within the SI system
 - Application to real world

APPLICATIONS

1. Identify suitable units to measure real objects - carpet size, purchase of produce and other goods, medicine, shoe laces, etc.

1. Estimate and measure length of familiar objects and distance between objects

1. Estimate and measure area of familiar objects (books, desk, room)
2. Estimate area covered by finger, hand, shoe

TOPICS

APPLICATIONS

4. Volume
- mm^3 , cm^3 , m^3
 - Selection of appropriate units
 - Estimation
 - Measurement - using centimetre cubes, calculation, formula
 - Application to regular solids
 - Conversion-equivalent units within SI system
 - Applications to real world

1. Measure small familiar objects
2. Estimate and calculate volume of large objects

5. Capacity
- ML, L
 - Estimation
 - Measurement-standard and irregular containers
 - Conversion-equivalent units within SI system
 - Application to the real world

1. Build a cubic decimetre
2. Estimate and measure volume. Relate to capacity

6. Mass
- mg, g, kg, t
 - Selection of appropriate units
 - Estimation
 - Conversion-equivalent units within SI system
 - Application within real world
 - Development of relationship between mass, capacity and volume units

1. Measuring - use of balances, scales

7. Pressure
- Kpa
(brief introduction only)

1. Barometric readings
2. Tire and oil pressure

TOPICS

8. Temperature
 - Celsius - °C
 - Identification of referent temperatures

APPLICATIONS

1. 30°C hot summerday:
150°C over temperature

It is suggested that the History of Measurement Elective be incorporated into the Measurement Strand (as an introduction).

C. Ratio and Rate

<u>TOPICS</u>	<u>APPLICATIONS</u>
1. Concept of ratio - As a fraction form for comparison: $\frac{\text{Circumference}}{\text{radius}}$ - Notation: $\frac{C}{r}$ or C:r - Development of equivalent ratios - from the concept of equivalent fractions - from similar triangles	1. Mixture problems 2. Probability - odds 3. Energy consumption 4. Scale drawings 5. Shopping 6. Salaries 7. Sales costs
2. Concept of rate - Per unit form e.g. litres per 100 kilometres, distance per hour	
3. Percent a) Concept of percent - Fraction form - denominator 100 - Other equivalent fraction forms - discounts b) - Percents to decimals - Decimals to percents - Percents to fractions to percents	1. Circle graphs 2. Scale diagrams 3. Grading 4. Taxation 5. Other business and commerce examples 6. Media material (newspaper, ads, flyer) 7. Other real world forms 8. Forecasting 9. Other subject areas

D. Data Presentation

TOPICS

1. Interpretation and application of data from charts and graphs
 - Include pictograph, circle graph, bar graph
2. Collection and tabulation of data from environmental situations
 - From experiments
 - From industrial examples
3. Construction of pictographs, bar graphs, circle graphs, line graphs from data collected

APPLICATIONS

1. Newspapers, other media
 2. Sports and other subject areas
 3. Weather forecasts
-
1. School activities
 2. Population trends
 3. Ethnic groups
 4. Others
-
1. Data on school activities
 2. Data on social affairs
 3. Data on car sales
 4. Data on use of drugs, alcohol, etc.,
 5. Others

E. Algebra

TOPICS

APPLICATIONS

1. Concept of an expression
 - identify specific algebraic terminology; constants, variables, terms and factors
2. Evaluating expressions
 - substitution into simple expressions and formulas
3. Words and Algebraic Expressions
 - translate English expressions into algebraic expressions
 - translate algebraic expressions into English expressions
4. Solution of Simple Equations in one Variable
$$a + x = b$$
$$ax = b$$
$$ax + b = c$$
$$\frac{x}{a} = \frac{b}{c}$$
$$ax + bx = c$$
5. Simple Word Problems

1. Science formulas e.g. $d=rt$, $E=IR$
business formulas e.g. $i=prt$
geometry formulas e.g.- area
 - perimeter
 - volume
1. Practical problems in the fields of science, business and technology

MATH 15

ELECTIVES



Banking Services (Mathematics 15)

<u>TOPICS</u>	SUBTOPICS (areas of application)
1. Bank Accounts	- Savings - Chequing - Personal chequing - Chequing-savings - Service charges - Deposits-cheques - Bank statements - Interest - simple and compound
2. Loans	- Single payment - Discount - Installment - Credit card - Debt consolidation - Education loans - Interest-simple and compound - Bankruptcy
3. Other Services	- Safety deposit box - Travellers cheques - Government bonds - Short term certificates and deposits - Senior citizen services
4. Banks	- Bank of Canada - role - Chartered banks - role, service - Provincial type banks - Credit Unions

Text References:

Math in Life

- various topics throughout text.

Math Plus

- parts of Units 4, 5 and 6.

Math for Daily Use

- sections 8.5 - 8.8

Additional Resources

- Royal Bank Education Kit - Your Money Matters.
- Alberta Consumer and Corporate Affairs has pamphlets, (Tip sheets), film clips regarding the section on loans.
- Attempt to make use of resource people within the community. (Credit Union, Banks, Trust Companies, etc.)
- Bank of Montreal's "Money & Banking" learning modules

Personal Salaries and Operating Costs (Mathematics 15)

<u>TOPICS</u>	<u>SUBTOPICS (areas of application)</u>
1. Personal Income	- Hourly wages - Salary - annual or monthly income - Commissions - Income tax (a major unit within Math 25) - Pension premiums - Medical insurance - Unemployment insurance - Others
2. Home Ownership Costs	- Mortgage payments - Utility costs - heat, power, water, telephone, television, etc. - Improvement costs - Insurance - Furnishings
3. Rental	- Comparative costs - Size, location, lease contracts - Comparison to ownership - Furnishings - Insurances - Utility costs - Others

Text References:

Math in Life - various topics throughout text.

Math Plus - Unit 4 - Earnings.

Additional Resources:

- Pamphlets available from Alberta Consumer and Corporate Affairs.
- Bank of Montreal's "Money & Banking" learning modules.

The Automobile (Mathematics 15)

TOPICS

SUBTOPICS (areas of application)

- | | |
|----------------------------|---|
| 1. Operating an automobile | <ul style="list-style-type: none">- New or used - initial cost- Loan plans- Insurance- Maintenance costs - operating expenses- Depreciation- License- Leasing- Fuel consumption versus speed |
| 2. Other items | <ul style="list-style-type: none">- Appreciation of cars (antique)- Leasing versus owning- Public transit versus driving- Fines and other costs involved in driving offences- Pollution- Brakes - types and effectiveness- Tires - cost and effectiveness |

Text References:

Math in Life - Fuel Costs pp. 34-35
 - Borrowing Money to Buy a Car pp. 98-99

Math Plus - Car loans pp. 154-155
 - Insurance pp. 180-183

Additional Resources:

Buying a Used Car (Kit containing 12 minute film, teaching guide, duplicating masters - available on loan from Alberta Consumer & Corporate Affairs).

Alberta Automobile Wholesale Guide (Blackbook).

Tipsheets from Alberta Consumer & Corporate Affairs

Consumer & Career Math - Unit 3, Ch. 7, 8, & 9.

Budgeting (Mathematics 15)

<u>TOPICS</u>	<u>SUBTOPICS (areas of application)</u>
1. Pricing Goods	- Comparison shopping, Canadian versus foreign items - Using the newspaper - Timing of sales - Seasonal buying - Bulk buying
2. Consumer Tips - Laws for Consumers	- See Consumer Affairs
3. Market Surveys	- Radio reports - T.V. programs - Government reports
4. Installment Purchases	- i.e., automobile, furniture and appliances - Finance charges (simple interest rates) - Monthly payments
5. Charge Accounts	- Types - credit cards and accounts - Credit limits - Minimum payment - Statements - Finance charges (cost of credits)
6. Discounts	- Cash - Trade - Chain
7. Sales Tax	- Provincial responsibility and purpose

TOPICS

SUBTOPICS (areas of application)

8. Flexible Budgeting

- Fixed expenses, flexible expenses
- Saving

9. Holidays

- See Travel and Recreation elective

Text References:

Math for Daily Use - Sections 8.1 - 8.4, 4.6 - 4.7 (Comparison Shopping)

Additional Resources (video):

"The Complete Consumer" - Budgeting and Credit (Programs 10, 11, 12, 13, and 14) - 15 min., video.

Program 10: "Rationale for Budgeting" (ACCESS Catalogue #210210)

Regardless of their specific lifestyles, most consumers are never quite sure where their money goes. The concept of planned spending and having an idea what expenses will be, compared with the money they will have to cover these expenses, will help consumers use their money wisely and avoid some unpleasant shocks.

* Good introduction to budget planning unit.

Program 11: "The Mechanics of Budgeting" (ACCESS Catalogue #210211)

Budgeting is not an exercise in when to stop spending money, but rather an exercise in where to spend it so that it will do the things you want. Future expenses that might only come up once a year need to be added to our regular monthly expenses to ensure that they won't come as a surprise.

Program 12: "Credit Use and Abuse" (ACCESS Catalogue #210212)

Credit - handle with care! Many people use credit wisely. They examine tomorrow, plan for it and fit their credit purchases into their plans. But credit can also be a way of spending tomorrow's money today. That means that you can have today what you can't afford until tomorrow... but what will you do tomorrow?

* Use in conjunction with the "Before You Go Under Guide" and film excerpts.

Program 13: "Types of Credit" (ACCESS Catalogue #210213)

The question we often hear when shopping, "Will that be cash or charge?" has many implications. The differences in interest rates, monthly payments and the length of the repayment plan are discussed. The consumer is encouraged to do some comparison shopping, as the services of credit should be treated like any other product.

* Good for simulation exercises for purchases and shopping for loans.

Program 14: "Contracts" (ACCESS Catalogue #210214)

Most contracts are fulfilled without any problems. The two parties involved understand each other and everything works out as they expected. It's when everything doesn't work out that the trouble starts. This program discusses the various parts of a contract, and outlines a procedure that can be followed to ensure that problems are avoided in future agreements.

(Dubs of the programs can be ordered from the Media Resources Centre of Access, 3350 Hospital Drive, N.W. Calgary, Alberta, T2N 4N1.

Additional material is also available from Alberta Consumer and Corporate Affairs, eg. Before You Go Under - A Self-help Financial Management Guide.

Travel and Recreation (Mathematics 15/25)

TOPICS

SUBTOPICS (areas of application)

- | | |
|--|---|
| 1. Travel Bureaus | <ul style="list-style-type: none">- Functions- Travel packages- Seasonal differences- Budget plans |
| 2. Compare Travel Costs | <ul style="list-style-type: none">- Car, bus, air- Special seasonal rates- Eurail |
| 3. Living Expenses | <ul style="list-style-type: none">- Meals- Recreation costs, ie, Disney World- Purchases- Tips- Gifts- Medical insurance |
| 4. Money Exchange and Modes of Money Use | <ul style="list-style-type: none">- Traveller's cheques- Use of credit cards- Custom regulations |
| 5. Map Reading | <ul style="list-style-type: none">- City maps- Provincial and State routesBrochures, re: travel-tourists offices |

Text References:

Math in Life

- throughout text

Math for Daily Use

- sections 1.3, 2.1, 7.5 (Chart & Map Reading)

Additional Resources:

Material available from Alberta Consumer and Corporate Affairs (Tipsheet - Vacation Planning), Travel Alberta and local travel agencies.

* If the "Travel and Recreation" elective is used for both Math 15 and Math 25, topics should be dealt with in greater depth at the Math 25 level, or, different topics of the elective should be chosen for each course.

ELECTIVES — OTHER

Calculator Literacy (Mathematics 15/25)

TOPICS

SUBTOPICS (areas of application)

1. Mechanical Aspects of Various Calculators

- Differences in power supply, automatic shut off
- Differences in on/off switch location
- Differences in keyboard layout
- Durability of construction and proper care of the instrument

2. Capabilities

- Basic operations (+, -, ×, ÷)
- Basic operations with decimal numbers
- Constant and memory features
- Special function keys
- Discuss other special function keys often available to science and commerce in special calculators

3. Limitations

- Recognize: digit capacity, overflow, "error", correction
- Type of functions: scientific, commerce
- Arithmetic limits: e.g. $(1/3 \times 3)$ is not equal to "1" using a calculator
- Limits of simple calculators in handling masses of data
- Complex computations, large number of repetitions

4. Calculator Errors

- Errors in reading and keying in data and operations
- Errors in reading output and display

TOPICS

SUBTOPICS (areas of applications)

5. When to Use

- Experience a broad range of use in a variety of computational and problem solving situations
- Use calculators in appropriate situations. Recognize and classify computational situations: e.g. (a) memorized number fact, (b) mental arithmetic, (c) pencil and paper arithmetic, (d) simple four-function or programmable calculator (e) computer

References:

Immerzeel, G. and Ockenga, E., Calculator Activities for the Classroom, Book 2, Creative Publications Inc., Palo Alto, California 1977

Vervoort, G., and Mason, D.J., "Intermediate Calculator Math", Fearon Pitman Publishers Inc., Belmont, California, 1980

Veervoort, G., and Mason, D.J., "Advanced Calculator Math", Fearon Pitman Publishers, Inc., Belmont, California, 1980

* If the "Calculator Literacy" elective is used for Math 15, it should not be taught as an elective in Math 25. However, the calculator literacy topics could be quickly overviewed depending on the needs of students.

History of Measurement (Mathematics 15)

TOPICS

SUBTOPICS (areas of application)

- | | |
|--------------------------------------|--|
| 1. The Need for Measurement | <ul style="list-style-type: none">- Primitive Man (Choosing club of sufficient size and weight, selecting an animal hide of adequate size, etc.)- Organized Societies - trade and commerce- Standardized Units |
| 2. Ancient Systems of Measurement | <ul style="list-style-type: none">- Egyptian Measure- Greek Measure- Roman Measure |
| 3. History of the English System | <ul style="list-style-type: none">- Influence of the Greeks, Romans and Scandinavians- Imperial Measure- American Measure |
| 4. History of the Metric System | <ul style="list-style-type: none">- Mathematical and Scientific Development (18th Century French Scientists) |
| 5. Le Système International d'Unités | <ul style="list-style-type: none">- Refinement and Extension of the Metric System- Increasing World Use of SI |

Text References

Math for Daily Use

- Section 5.2 (Beginnings of Measurement)

Additional Resources

- 1) Black, G.J., "Canada Goes Metric" Doubleday Canada Ltd., Toronto, Ontario, 1974
- 2) Singer Education & Training Products, "English or Metric?" "That is the Question", Clearvue Inc., Chicago (set of 4 filmstrips and cassette tapes, two of the filmstrips are entitled "History of the Metric System" and "History of the English System")

- available from Education Film Distributors Ltd., 285 Lesmill Road, Don Mills, Ontario, M3B 2V1

Computer Literacy (Mathematics 15/25)

TOPICS

SUBTOPICS (areas of application)

1. History of Computing
2. How Computers Work
 - Structure of computer systems
 - Functions of five major parts
3. Control of Computers
 - Communication with computers
 - How to instruct computers
4. What Computers Can and Cannot Do
 - Capabilities and limitations
 - Misconceptions about computers
5. Characteristics of Computers
 - Speed, accuracy, and need for appropriate commands
6. Effect of Computers on Society
 - Impact on individual groups, the economy, education, jobs, crime, etc.
 - Benefits and dangers of computerization
7. Application of Computers
 - Uses in business, government, science, education, etc.,
 - Computer careers
8. Computers and the Future
9. Microcomputer Operation (For those schools with machines available)
 - Canned games and simulation programs
 - Familiarization with the communication process
10. Introductory Programming

* These topics for computer literacy are fairly comprehensive; any one or more of the topics may be chosen. It is not expected that the total literacy elective be attempted.

If the "Computer Literacy" elective is used for both Mathematics 15 and Mathematics 25, topics should be dealt with in greater depth at the Mathematics 25 level, or different topics within the elective should be chosen for each course.

Ideas for the above topics were adopted from Monitor, November, 1979.

References:

BOOKS

Creative Computing Press. Tales of the Marvelous Machine. Morristown, N.J.: Creative Computing Press, 1980.

.....a collection of thirty-five short stories about computers and computing.....the stories are modern and readable and would liven up any secondary computing class.

Horn, Carin E. et al. Computer Literacy: Problem-Solving with Computers. Austin, Texas: Sterling Swift Publishing Company, 1981

.....an excellent text covering all aspects of computer literacy..... now accompanied by an Instructional Manual another must for all teachers interested in promoting computer literacy.

Microcomputer Systems and APPLE BASIC. Austin, Texas: Sterling Swift Publishing Company, 1980

.....for the teacher who is new to computing and plans to use the APPLE the section on flow charting is extremely well done: one of the best explanations available.

Saskatoon Board of Education. Computer Literacy. Saskatoon, Saskatchewan, 1979.

.....consists of three components: 1) Computer Literacy Manual for teachers stressing flowcharting and programming in BASIC: 2) Worknotes for students: 3) Supplementary Materials for teachers covering the topics of History of Computing, Components, Applications, and Social Impact of Computers.....used by Saskatoon schools with all students in grade 7 and 8 mathematics classes.

PERIODICALS

Creative Computing
P.O. Box 789-M
Morristown, N.J. 07960

.....articles, programs and advertisements directed to the consumer, personal computing, and the general public with a wide range of sophistication and needs.....for students and the public with some background in computers.

PERIODICALS CONT.

Classroom Computing News

Cambridge, Massachusetts 02138

.....the only commercial publication that focuses on instructional computing K-12 currently, the best publication in this field.

The Computing Teacher

Computing Center

Eastern Oregon State College

LaGrande, Oregon 97850

.....at this time, the leading publication on instructional computing
.....a must for teachers interested in any of the many facets of
computer use in the schools.

COURSEWARE

Title: Computer Discovery

by: Science Research Associates, Inc.

Materials: Two diskettes (APPLE or Atari)
Junior High Student Workbook, or
Senior High Student Workbook
Instructor's Guide

.....designed to introduce computer concepts including programming and social issues related to computers.....probably best used as a springboard for further study.....the junior high workbook appears somewhat difficult for average and below average students.....the programming material does not relate to the BASIC language.....the portion dealing with computer concepts is fairly difficult for junior high students.

AUDIO VISUAL AIDS

Silicon Factor

Available from ACCESS. It is a three-part sequel to B.B.C.'s "Now the Chips are Down".

1. So What's It All About

Looks at the silicon chip and its mushrooming applications.

2. Sink or Swim

Looks at the effect of silicon chip technology on all aspects of industry.

3. And What of the Future

The effect of the rapidly expanding chip technology on employment, and life styles.

Pythagorean Theorem and Similar Triangles

(Mathematics 15)

<u>TOPICS</u>	<u>SUBTOPICS (areas of application)</u>
1. Pythagorean Theorem	- Right triangle - Reading tables - Practical problems
2. Similar Triangles	- Finding missing sides - Practical problems (finding heights, distances, etc.)

Text References:

(i) Pythagorean Theorem

Mathematics Plus - (pages 40-41)

Mathematics in Life - (pages 364-367, 376-379)

Math for Daily Use - sections 7.6, 7.7, 7.9

(ii) Similar Triangles

Math in Life - (pages 202-203, 206-207)

Graphing on a Co-ordinated Grid (Mathematics 15)

<u>TOPICS</u>	<u>SUBTOPICS (areas of application)</u>
1. Locating Points on a Grid	- City Maps - Battleship
2. Coordinates as Ordered Pairs	
3. Cartesian Coordinate Plane	- x-axis, y-axis, origin - locating points on the plane - reading coordinates from the plane

Text References:

Math in Life - Chapter 15 - Graphing

Math Plus - Unit 12 - Graphing Points and Lines

Math for Daily Use

- Sections 2.1 - 2.3 (Maps & Tables)
- Section 2.4 (Making Line Graphs)
- Section 2.5 (Graphing Pictures)

TEXT/PROGRAM CORRELATION

If you have chosen 'MATHEMATICS IN LIFE' as your text for Math 15, the following is a suggested outline that correlates the Math 15 Course Outline, Alberta Education, 1982, with text.

NOTE: The topics that are starred (*) could be considered as optional material.

CORE MATERIAL

Unit 1 WHOLE NUMBERS

Ch#1 - Adding and Subtracting Whole Numbers

Ch#2 - Multiplying Whole Numbers

Ch#3 - Dividing Whole Numbers

Unit 2 DECIMALS AND THE METRIC SYSTEM

Ch#4 - Adding and Subtracting Decimals

Ch#5 - Multiplying and Dividing Decimals

Ch#6 - The Metric System

Unit 3 FRACTIONS, MIXED NUMBERS AND PROBABILITY

Ch#7 - Multiplying and Dividing Fractions and Mixed Numbers

Ch#8 - Adding and Subtracting Fractions and Mixed Numbers

* Ch#9 - Probability

Unit 4 RATIO, PERCENT AND STATISTICS

Ch#10 - Ratio, Proportion, *Similarity

Ch#11 - Percent

Ch#12 - Statistics

Unit 5 ALGEBRA

Ch#13 - Positive and Negative Numbers

Ch#14 - Expressions and Equations

ELECTIVE MATERIAL

- Consumer topics are included throughout all of the above units.
- Calculator exercises are included at the end of each unit.
- Ch#15 - Graphing on a Coordinate Grid

If you have chosen 'MATH PLUS' as your text for Math 15, the following is a suggested outline that correlates the Math 15 Course Outline, Alberta Education, 1982, with the text.

NOTE: Those topics that are starred (*) could be considered as optional material.

CORE MATERIAL

Unit #1 WHOLE NUMBERS AND DECIMAL/MEASUREMENT

- Adding, Subtracting, Multiples of Whole Numbers and Decimals
- Metric Measurement - length, mass, liquid measure

Unit #2 FRACTIONS/GEOMETRY (excluding pages 40-41, 56-59, 60-61)

- Adding and Subtracting Fractions and mixed numbers
- Multiplication and Division of Fractions and mixed numbers

Unit #3 RATIO, PROPORTION, PERCENT/STATISTICS

- Ratio and Proportion
- Decimal, Fraction and Percent Equivalents
- % of a Number
- Sampling and Prediction
- Mean, Median, Mode
- Bar Graphs, Line Graphs, Circle Graphs
- Analysis of Data (pages 286-294)

Unit #10 NUMBERS AND EXPRESSIONS

- Positive and Negative Numbers - BASIC OPERATIONS
- Order of Operations
- Expression and Variables
- * - Expression with Exponents
- * - Words and Algebraic Expressions

Unit #11 EQUATIONS AND FORMULAS (Note: Section Marked * could be considered as OPTIONAL)

- Solution of Single Equations by Adding, Subtracting
- * - Solution of Word Problems Using Equations
- Solution by Reciprocals
- * - Equations with Decimals
- * - Formulas
- Using Equations, Solving Equations
- Addition of Expression, General Solutions
- * - Applications and Solving Word Problems

ELECTIVE MATERIAL

Unit #4 INCOME

- Earnings (pages 102-111)
- Banking (pages 122-130)

Unit #5 CREDIT

- Credit Cards and Installment Buying
- Loans
- Home and Auto Loans

Unit #12 GRAPHING

- Points and Lines (pages 366-375)

If you have chosen "MATHEMATICS FOR DAILY USE" as your text for Math 15, the following is a suggested outline that correlates the Math 15 Course Outline, Alberta Education, 1982, with text.

NOTE: The topics that are starred (*) could be considered as optional material.

CORE MATERIAL

Chapter 1 USING TABLES AND GRAPHS

- 1.1 Reading Bar Graphs
- 1.2 Reading Lone Graphs
- 1.3 Using Tables
- 1.4 A Further Look at Graphs
- 1.5 Pictographs

Chapter 2 MAKING GRAPHS

- 2.1 Reading Maps
- 2.4 Making Line Graphs
- * 2.5 Graph Pictures
- 2.6 Making Bar Graphs
- 2.7 Reading Circle Graphs

Chapter 3 EQUATIONS AND FORMULAS

- 3.1 Open Sentences
- 3.2 Parenthesis
- 3.3 Order of Operations
- 3.4 Using Formulas
- 3.5 Equations with Addition/Subtraction
- 3.6 Equations with Multi/Division
- 3.7 Two Step Equations
- 3.8 Equations With Fractional Solutions
- 3.9 Equations Containing Fractions
- 3.10 Solving Problems With Formulas

Chapter 4 RATIOS AND PROPORTIONS

- 4.1 Ratios
- 4.2 Equivalent Ratio
- 4.3 Proportions
- 4.4 Solving Problems With Proportions
- 4.5 Similarity
- 4.6 Proportions and Comparing
- 4.7 Common Values for Comparisons
- 4.8 Percent as Ratio
- 4.9 Using Percent
- 4.10 Solving Problems With Percents
- 4.11 Percents in Decimal Form
- 4.12 Estimating With Percents

(Concept of Rate is included in some parts of Chapter 3, but examples such as L/100 km need supplementing).

Chapter 5 MEASUREMENT

- 5.1 Picking a Unit of Measure
- 5.3 Measuring Length
- 5.4 Equivalent Lengths
- 5.5 Mass
- 5.6 Capacity
- * 5.7 Time
- * 5.8 24-Hour Clock
- 5.10 Temperature
- * 5.11 Measuring Angles

Chapter 6 PLANE FIGURES

- 6.1 Polygon
- 6.2 Perimeter
- 6.3 Measuring With Squares
- 6.4 Area
- 6.5 Equivalent Areas
- 6.6 Parallelogram
- 6.7 Triangles
- 6.8 Trapezoids
- * 6.9 Square Roots
- * 6.10 Circumference
- * 6.11 Area of a Circle

Chapter 9 SOLIDS

- * 9.1 Models of Rectangular Solids
- * 9.2 Models of Right Prisms
- 9.3 Measuring with Cubes
- 9.4 Volume
- 9.5 Equivalent Volume
- 9.6 Surface Area
- * 9.7 Cylinder

Chapter 10 CHANCE AND ESTIMATES

- 10.5 Estimating Sums
- 10.6 Estimating Differences
- 10.7 Estimating Products
- 10.8 Estimating Quotients
- 10.9 Solving Problems by Estimating

COMPUTING SKILLS REFRESHER

Use to supplement "Core" program as dictated by student needs and capabilities.

ELECTIVE MATERIAL

Section 8.5 - 8.8 BANKING SERVICES

- Checking Accounts
- Bank Statement
- Interest Rate

Section 4.6 - 4.7 BUDGETING

Section 8.1 - 8.4

- Comparison Shopping
- Budget

Section 1.3; 2.1; TRAVEL AND RECREATION

7.5

- Chart and Map Reading

Section 5.2

HISTORY OF MEASUREMENT

- Beginning of Measurement

Section 7.6; 7.7; PYTHAGOREAN THEOREM AND SIMILAR TRIANGLES

7.9

- Similar Triangles
- Indirect Measure

Section 2.1 - 2.5 GRAPHING ON A CO-ORDINATED GRID

- Maps and Tables
- Making Line Graphs
- Graphing Pictures

Additional Video Resource - Mathematics 15-25

MATHWISE Television Series

MATHWISE is a series of 12 television programs designed to teach four modules: measuring, comparing, locating/interpreting and predicting to grade nine and ten students. Each program includes a documentary and dramatic segment. The documentaries introduce the math skills and illustrate their use in everyday situations and the dramatic segments show students using the same skills to solve problems. A teacher's guide is also available.

MATHWISE was produced by the Agency for Instructional Television, a consortium of 23 state and provincial agencies from Canada and the United States.

MATHWISE is available through the ACCESS Media Resource Centre, Health Science Centre, 3350 Hospital Drive, N.W., Calgary, Alberta, T2N 4N1. Phone 283-8241.



A. Number System Review

<u>TOPICS</u>	<u>APPLICATIONS</u>
1. Whole Numbers (a) Operations (b) Properties	1. Living expenses 2. Sales 3. Games 4. Problem solving skills
2. Integers (a) Concept of integers (b) Order of integers - Location on a number line (c) Operations - Four basic operations	1. Relate to the real world 2. Temperature 3. Sports 4. Elevation 5. Credit Accounts 6. Deposits and withdrawals 1. Interpretation in real world, i.e., travel, profit and loss 1. GNP, living costs, deficit financing, credit accounts, bank deposits and withdrawals balance of trade 2. Temperature changes 3. Reading elevation differences, temperature differences, etc., from maps
3. Rational Numbers (a) Concept of rational numbers (b) Operations (c) Convert positive or negative rationals in the form of $\frac{a}{b}$ to decimals and b vice versa	1. Sales - $\frac{1}{3}$ off, etc. 2. Recipes 3. Stockmarket 4. Time

TOPICS

4. Percent
 - (a) Concept of percent
 - Fraction form - denominator 100
 - Other equivalent fraction forms
 - Discounts
 - (b) Conversion
 - Percents to Decimals
 - Decimals to percents
 - Percent to fractions to percents

APPLICATIONS

1. Circle graphs
2. Scale diagrams
3. Formulae
4. Grading
5. Taxation
6. Other business and commerce examples
7. Media material
8. Population
9. Other real world forms
10. Forecasting
11. Other subject areas

B. Algebra

TOPICS

1. Equations
 - (a) Definition of an equation
 - (b) Rules of equations
 - (c) Transposing terms
 - (d) Combining like terms
 - (e) Equations containing fractions and decimals

APPLICATIONS

1. Examine practical problems in the fields of science, business and technology using algebraic and graphical solutions
2. Science formulas - temperature, distance rate - parachutist's fall
Geometry formulas - area, perimeter
3. Grid plans for cities and new townsites
Telephone rates are based on a rate system

C. Data Presentation

1. Organization of data
 - Tables
 - Graphs
2. Use of frequency tables and diagrams
 - Population
 - Classes
 - Intervals

1. Relate to charts, graphs and tables in magazines, newspapers, books, kilometre distance charts on maps, etc.
2. Inaccurate and biased tables
 1. Student grades
 2. Height and weight
 3. Birth rates
 4. Salaries

DATA PRESENTATION CONT.

TOPICS

3. Representation and study of data in graphical form
 - Pictographs
 - Circle graphs
 - Bar graphs
 - Line graphs
 - Misleading graphs
 - Scatter diagrams
 - Predictions
4. Finding mean, median, and mode
 - interpretation and use

APPLICATIONS

1. Business and Commerce - GNP, budgets, employment figures, imports and exports, insurance rates and mortality tables, salaries
2. Environment - pesticides, traffic, pollution fuel efficiency, population makeup, temperatures, energy supplies.
3. Health and Medicine - growth rates, calories, hazards of smoking, muscle fatigue, pulse rate, blood types
4. People and Culture - census figures, population sizes and trends, voice ranges, instruments
5. Recreation - sports (batting averages, etc.) gambling, types of T.V. programs

D. Life Skills

TOPICS

APPLICATIONS

- | | |
|--|--|
| <p>1. The World of Work</p> <ul style="list-style-type: none">- Methods of payment- Gross Pay- Take Home Pay | <ul style="list-style-type: none">- Salaries, commissions, piecework, overtime- Deductions (U.I., C.P.P., Union Dues, Income Tax, others) |
| <p>2. Income Tax
(Note: suggested that teachers use the TAX BOOK for the current year. This is available from Revenue CANADA TAXATION.)</p> | <ul style="list-style-type: none">- History of Canadian Income Tax- Filing of a simple Income Tax return (i.e., student part time job)- Filing more complicated income tax returns (i.e., married with dependents, 2 jobs, U.I.) |
| <p>3. Money Management</p> <ul style="list-style-type: none">- Gross Income- Total Expenditures (rent, food, clothing, transportation, recreation)- Net Income and savings- Filing Income Tax Return based on above | <ul style="list-style-type: none">- Budgeting for yourself while living with your parents- Budgeting for yourself while supporting yourself- Budgeting for yourself and your imaginary family after you have "graduated" from your chosen career and are employed fulltime |

Refer to Appendix for suggested strategies for #3 Money Management. In addition, reference may be made to various Math 15/25 Consumer electives.

NOTE: Topics suggested for the Life Skills section may have been taken previously by the student in other courses. Teachers are advised to check for possible overlap beforehand.



A. Consumer Topics

Insurance (Mathematics 25)

<u>TOPICS</u>	<u>SUBTOPICS (areas of application)</u>
1. Life	- Straight life, endowment, term - Group life - Disability forms - Special features - premiums, double indemnity, insured policies, cash value, borrowing clauses, mortality tables, etc.
2. Health	- Alberta Health Plan - Blue Cross - Dental Plans - Travel Insurance - life and health
3. Home Owners	- Home, other units - fire, theft, water, storms, etc. - Contents - furniture, other contents - Special possessions - Premiums, liability, etc. - Understanding blueprints
4. Auto	- Types - liability, collision, comprehensive, medical - Rate factors - vehicle type, living location, personal aspects of insured - No fault insurance - Provincial insurance plans - Others - boats, snowmobiles, etc.

References:

It is suggested that pamphlets from insurance companies, and Alberta Health Care be obtained for further elaboration.

Taxation (Mathematics 25)

<u>TOPICS</u>	<u>SUBTOPICS (areas of application)</u>
1. Federal Taxes	- Income - Capital Gains - Sales - Excise, customs and duties
2. Provincial Taxes	- Income - Special forms - license, car fishing - road tax - death tax
3. Municipal Taxes	- Home and property - Recreational property - Terms - assessment, mill rate, etc.
4. Sales Taxes	- Provincial forms - Taxable and non-taxable items

References:

The Tax Book - available free of charge. Write:

Teaching Taxes
Information Services Branch
Revenue Canada, Taxation
875 Heron Road
OTTAWA, Ontario
K1A 0L8

Loans and Financing (Mathematics 25)

<u>TOPICS</u>	<u>SUBTOPICS (areas of application)</u>
1. Bank Loans	- Types of loans - Interest charges - Mortgages - Other services - Educational
2. Credit Card	- General credit cards - bank association - Store or company cards - Annual and monthly rates - Advantages and disadvantages - Revolving charge accounts - Special credit card loans
3. Installment Buying	- Types - Percentage rates - interest rates - Monthly payments
4. Finance Companies	- Loan types - Interest charges - Methods of payment

References:

Materials available from Alberta Consumer and Corporate Affairs

Royal Bank Education Kit - Your Money Matters

Bank of Montreal's "Money & Banking" learning modules

It is suggested that finance companies, banks, etc., be contacted for available materials, and for the use of resource persons.

Investments (Mathematics 25)

<u>TOPICS</u>	<u>SUBTOPICS (areas of application)</u>
1. Commodities	- Gold - Silver - Other Metals - Grain - Livestock - Jewellery - Stamps - Antiques
2. Stocks and Bonds	- Stocks - Mutuals - Saving Bonds
3. Real Estate	- Land - Buildings - Mortgage investment companies
4. Cash Deposits	- Savings account (a) Banks (b) Trust companies - Pensions - RRSP - RHOSP

References:

Contact brokers and real estate personnel for supplementary resources and available resource persons.

Travel and Recreation (Mathematics 15/25)

<u>TOPICS</u>	<u>SUBTOPICS (areas of application)</u>
1. Travel Bureaus	- Functions - Travel packages - Seasonal differences - Budget plans
2. Compare Travel Costs	- Car, bus, air - Special seasonal rates - Eurail
3. Living Expenses	- Meals - Recreation costs, ie, Disney World - Purchases - Tips - Gifts - Medical insurance
4. Money Exchange and Modes of Money Use	- Traveller's cheques - Use of credit cards - Custom regulations
5. Map Reading	- City Maps - Provincial and State routes - Brochures, re: travel-tourists offices

Text References:

Math in Life

- throughout text

Math for Daily Use

- Sections 1.3, 2.1, 7.5 (Chart & Map Reading)

Additional Resources:

Material available from Alberta Consumer and Corporate Affairs (Tipsheet - Vacation Planning), Travel Alberta and local travel agencies.

* If the "Travel and Recreation" elective is used for both Math 15 and Math 25, topics should be dealt with in greater depth at the Math 25 level, or different topics of the elective should be chosen for each course.

B. Geometry (Mathematics 25)

OBJECTIVES

1. Concepts and Terminology

(a) Angles - related terms and concepts

Vertex, side (ray), degree straight angle, right angle, acute, obtuse, reflex, adjacent, complementary, supplementary, vertically opposite

(b) Triangles - related terms and concepts

Equilateral, equiangular, isosceles, scalene, obtuse, right, hypotenuse, Pythagorean Theorem, conditions for similarity, congruence, trigonometry

(c) Polygons - related terms

Quadrilateral, trapezoid, parallelogram, rectangle, rhombus, square, regular, diagonal

(d) Parallel lines - related terms and concepts

Transversal, corresponding angles, alternate angles, interior angles, conditions for parallelism when a transversal intersects two lines

(e) Circle

Centre, radius, diameter, sector, segment, chords, etc.

APPLICATIONS

1. Paper folding
2. Geoboard
3. Advertising in newspaper etc.
4. In nature
5. Filing papers - environment, arts, wallpaper, clothing
6. Surface areas in classroom, home, shop and home economics.
7. Advertising
8. Sports
9. Traffic signs
10. Construction industry
11. Jewellery design

GEOMETRY CONT.

OBJECTIVES

2. Measure an angle with a protractor
3. Construct
 - (a) An angle congruent to a given angle
 - (b) The bisector of a given angle
 - (c) A perpendicular to a given segment
At a given point on a segment
Through a point not on the same segment
 - (d) Right bisector of a line segment
 - (e) A line parallel to a given line
 - (f) Construct angles
 30° , 45° , 60° , 90°
 - (g) Construct geometric figures
Square, rectangle, parallelogram, triangle
4. Prisms and Pyramids

- (a) Prisms
Identified by the base; vertex edge, face; description of prisms in the real world
- (b) Pyramids
Identified by the base; vertex, edge, face, description of pyramids in the real world

APPLICATIONS

1. Make a protractor
1. Use slides, turns reflections
2. Using compass, straight edge and Mira
1. Curve stitching
2. Points, lines, planes in classrooms, shops, school, home
3. Three-dimensional modes
4. Three-dimensional objects in classroom, school, shops, homes
5. Supermarket
6. Architecture, buildings
7. Nets of 3-D objects
8. Nature

GEOMETRY CONT.

OBJECTIVES

5. Trigonometry

- (a) Find unknown sides in similar triangles
- (b) Apply similar triangles to practical problems, e.g., height of a building, distance across a river, etc.
- (c) Define sine, cosine and tangent functions for right angle triangles
- (d) Find the ratios of two acute angles in a right triangle when the sides are given
- (e) Use tables to find trig ratios for a given angle
- (f) Use tables to find an angle when one of the ratios is given
- (g) Solve problems based on right triangles using trigonometric ratios

6. Pythagorean Theorem

APPLICATIONS

1. Measuring distances to man-made satellites and the moon
2. Measuring by triangulation - use of a range finder
3. Measure circumference of the earth using Eratosthene's method
4. Finding distances and heights of mountains, tress, rivers, buildings - slope
5. Surveying and scaling
6. Navigation problems by air and water
7. Photography - enlargements and reductions
8. Architectual designs
9. Orienteering
10. Use of apparatus - clinometer, theodolite, transit
11. Apply to radar

Using the Pythagorean Theorem to calculate indirect measures

Verify measures gained in trigonometric calculations

Calculate heights of cones

In addition to squares on the sides of a right triangle to prove Pythagoras, use equilateral triangles, semi-circles, regular pentagons, etc.

Make a Pythagorean spiral

Text Reference:

- *Math you Need Book 2* (Nelson)

Additional Resources

- *Math you Need Book 1* (Nelson)

C. Powers and Roots (Mathematics 25)

OBJECTIVES

1. Laws of indices - understanding and estimation of powers and roots
2. Calculations involving powers
 - (a) Multiplication
 - (b) Division
3. Calculation of square roots
 - (a) Using tables
 - (b) Using calculators
4. Scientific notation
 - (a) Changing conventional numbers into scientific notation form
 - (b) Converting scientific notation into conventional form
 - (c) Multiplication
 - (d) Division

APPLICATIONS

- Naming distances within the universe
- Rewriting answers to products and quotients that are very large or very small
- Relating scientific notation to pictographs

D. Probability (Mathematics 25)

OBJECTIVES

1. Notion of probability and chance
2. Finding probabilities and predicting outcomes
3. Finding probabilities using a tree diagram
4. Rule for simple probability
5. Odds
6. Dependent and independent events

APPLICATIONS

1. Dice, playing cards, spinners
2. Sports
3. Codes
4. Bingo
5. License plates
6. Telephone numbers
7. Weather
8. Coin combinations
9. Insurance
10. Seating arrangements
11. Genetics

Additional Resources:

- *Math Plus* (Houghton Mifflin)
- *Mathematics for Daily Use* (Double Day)
- *Math you Need Book 1* (Nelson)

E. Motion Geometry (Mathematics 25)

A Study of Transformations

OBJECTIVES

1. Overview of Transformations

Mapping, distance preserving,
isometry, congruence

Study of motions in geometry

Models - mirrors, mira, paper
folding, tracing paper

2. Basic Terminology

Translations (slides)

Reflections (flips)

Rotations (turns)

Dilations (enlargements and
reductions)

Distortions

Line Symmetry

Rotational symmetry

3. Translation (slides

Illustrate slides - object,
image, slide, arrow, etc.

Identify relation to
congruency

Relation to vectors

Illustrations in real world

Properties

Application in real world

Tracing on grid systems

Skids, ski-lifts

Art work - tessalations,
wallpaper, lettering, signs

Machinery - pulleys, planes,
etc.

Movie machines, film frames

Logos

Games - pool, television

4. Reflections (Flips)

Illustrate flips through
activities - object, image,
reflection line, symmetry

Relation to congruency
through parallel lines

Tracing on grid systems

Mirror images - science
concepts

Letter through mira

Art work

MOTION GEOMETRY CONT.

OBJECTIVES

Illustrations - art and nature, etc.

Properties

Composition of motion

Applications in real world

5. Rotations (turns)

Illustrate turn images - centre of rotation, angle of rotation, etc.

Relation to reflection and congruency through intersecting lines

Illustrations

Properties

Applications in real world

6. Dilations (size transformation)

Develop enlarged and reduced images

Scale drawings

Applications in real world

7. Distortions

Draw images using a distorted grid

8. Basic Constructions

Perpendicular and parallel lines

Construct geometric figures - various polygons

Bisections

Corresponding segments

Circle

APPLICATIONS

Illustrations in nature

Trace on grid system

Turns in real world - transportation careers, driving, etc.

Industry - machinery, lathes, car repair, etc.

Use in art world - geometric

Mapping

Scale drawing

Photography

Film Industry - projection microfiche

Mirrors - circus

Art World

MOTION GEOMETRY CONT.

OBJECTIVES

9. Symmetry and Congruency

Both topics integrated within
basic motion studies

Line, plane and rotational
symmetry

Applications

Properties

ELECTIVES — OTHER

Calculator Literacy (Mathematics 15/25)

<u>TOPICS</u>	<u>SUBTOPICS (areas of application)</u>
1. Mechanical Aspects of Various Calculators	- Differences in power supply, automatic shut off - Differences in on/off switch location - Differences in keyboard lay out - Durability of construction and proper care of the instrument
2. Capabilities	- Basic operation (+, -, x, ÷) - Basic operations with decimal numbers - Constant and memory features - Special function keys - Discuss other special function keys often available to science and commerce in special calculators
3. Limitations	- Recognize: digit capacity, overflow, "error", correction - Type of functions: scientific, commerce - Arithmetic limits; e.g. $(1/3 \times 3)$ is not 1 using a calculator - Limits of simple calculators in handling masses of data - Complex computations, large number of repetitions
4. Calculator Errors	- Errors in reading and keying in data and operations - Errors in reading output and display

TOPICS

5. When to Use

SUBTOPICS (areas of applications)

- Experience a broad range of use in a variety of computational and problem solving situations
- Use calculators in appropriate situations. Recognize and classify computational situations: e.g. (a) memorized number fact, (b) mental arithmetic, (c) pencil and paper arithmetic, (d) simple four-function calculator, (e) multi-function or programmable calculator (f) computer

References:

Immerzeel, G. and Ockenga, E., Calculator Activities for the Classroom, Book 2, Creative Publications Inc., Palo Alto, California 1977

- Available from Setsco

Vervoort, G., and Mason, D.J., "Intermediate Calculator Math", Fearon Pitman Publishers Inc., Belmont, California, 1980

Vervoort, G., and Mason, D.J., "Advanced Calculator Math", Fearon Pitman Publishers, Inc., Belmont, California, 1980

* If the "Calculator Literacy" elective is used for Math 15, it should not be taught as an elective in Math 25. However, the calculator literacy topics could be quickly reviewed depending on the needs of students.

Computer Literacy (Mathematics 15/25)

TOPICS

SUBTOPICS (areas of application)

- | | |
|--|---|
| 1. History of Computing | |
| 2. How Computers Work | <ul style="list-style-type: none"> - Structure of computer systems - Functions of five major parts |
| 3. Control of Computers | <ul style="list-style-type: none"> - Communication with computers - How to instruct computers |
| 4. What Computers Can and Cannot Do | <ul style="list-style-type: none"> - Capabilities and limitations - Misconceptions about computers |
| 5. Characteristics of Computers | <ul style="list-style-type: none"> - Speed, accuracy and need for appropriate commands |
| 6. Effect of Computers on Society | <ul style="list-style-type: none"> - Impact on individual groups, the economy, education, jobs, crime, etc. - Benefits and dangers of computerization |
| 7. Application of Computers | <ul style="list-style-type: none"> - Uses in business, government, science, education, etc., - Computer careers |
| 8. Computers and the Future | |
| 9. Microcomputer Operation (For those schools with machines available) | <ul style="list-style-type: none"> - Canned games and simulation programs - Familiarization with the communication process |
| 10. Introductory Programming | |

* These topics for computer literacy are fairly comprehensive; any one or more of the topics may be chosen. It is not expected that the total literacy elective be attempted.

If the "Computer Literacy" elective is used for both Mathematics 15 and Mathematics 25, topics should be dealt with in greater depth at the Mathematics 25 level, or different topics within the elective should be chosen for each course.

Ideas for the above topics were adopted from Monitor, November, 1979.

References:

BOOKS

Creative Computing Press. Tales of the Marvelous Machine. Morristown, N.J.: Creative Computing Press, 1980.

.....a collection of thirty-five short stories about computers and computing.....the stories are modern and readable and would liven up any secondary computing class.

Horn, Carin E. et al. Computer Literacy: Problem Solving with Computers. Austin, Texas: Sterling Swift Publishing Company, 1981.

.....an excellent text.....now accompanied by an Instructional Manual.....another must for all teachers interested in promoting computer literacy.

Microcomputer Systems and APPLE BASIC. Austin, Texas: Sterling Swift Publishing Company, 1980.

.....for the teacher who is new to computing and plans to use the APPLE.....the section on flow charting is extremely well done; one of the best explanations available.

Saskatoon Board of Education. Computer Literacy. Saskatoon, Saskatchewan, 1979.

.....consists of three components: 1) Computer Literacy Manual for teachers stressing flowcharting and programming in BASIC: 2) Worknotes for students: 3) Supplementary Materials for teachers covering the topics of History of Computing, Components, Applications, and Social Impact of Computers.....used by Saskatoon schools with all students in grade 7 and 8 mathematics classes.

PERIODICALS

Creative Computing
P.O. Box 789-M
Morristown, N.J. 07960

.....articles, programs and advertisements directed to the consumer, personal computing, and the general public with a wide range of sophistication and needs.....for students and the public with some background in computers.

PERIODICALS CONT.

Classroom Computing News

Cambridge, Massachusetts 02138

.....the only commercial publication that focuses on instructional computing K-12.....currently, the best publication in this field.

The Computing Teacher

Computing Center

Eastern Oregon State College

LaGrande, Oregon 97850

.....at this time, the leading publication on instructional computing
.....a must for teachers interested in any of the many facets of computer use in the schools.

COURSEWARE

Title: Computer Discovery

by: Science Research Associates, Inc.

Materials: Two diskettes (APPLE or Atari)
Junior High Student Workbook, or
Senior High Student Workbook
Instructor's Guide

.....designed to introduce computer concepts including programming and social issues related to computers.....probably best used as a springboard for further study.....the junior high workbook appears somewhat difficult for average and below average students.....the programming material does not relate to the BASIC language.....the portion dealing with computer concepts is fairly difficult for junior high students.

AUDIO VISUAL AIDS

SILICON FACTOR

Available from ACCESS. It is a three-part sequel to BBC's "Now the Chips are Down".

1. So What's It All About

Looks at the silicon chip and its mushrooming applications.

2. Sink or Swim

Looks at the effect of silicon chip technology on all aspects of industry.

3. And What of the Future

The effect of the rapidly expanding chip technology on employment, and life styles.

TEXT/PROGRAM CORRELATION

If you are using "MATH YOU NEED," Book 2 as your text for Math 25, the following is a suggested outline that correlates the Math 25 Course Outline, Alberta Ed., 1982, with the text.

Note: Those topics that are starred (*) could be considered as optional material.

CORE MATERIAL

Unit 1 MATH in SPORT

- Add, Subtract, Multiply and Division of whole numbers.
- Average of sets of whole numbers.
- Percentages.
- Rounding off.

Unit 2 AUTOMOTIVE MATH

- Add, Subtract, Multiply, Divide decimals.
- % to decimals; decimals to %.
- GASOLINE costs, fuel consumption rates.
- Car maintenance and repair costs.
- Depreciation.

Unit 3 FINDING YOUR OWN PLACE

- Fractions to decimals; fractions to percents.
- Expenses incurred in renting an apartment.
- Telephone bills.
- Hydro bills.
- Budgeting.

Unit 4 RUNNING YOUR OWN PLACE

- % operations with decimals.
- Graph interpretations.
- Buy a home - MORTGAGES; real estate commissions.
- Expenses incurred in owning and operating a home - heating costs; taxes; upkeep
- Budgeting.

Unit 5 SPENDING MONEY

- % to decimals and fractions and VICE VERSA.
- % of a number.
- Budgeting.
- FINDING DOLLAR DISCOUNTS: SALE PRICE.
- Comparison shopping - getting the best deal.

Unit 6 EARNING MONEY

- Add, Subtract, Multiply and Divide Decimals and Whole Numbers.
- Wages earned at a regular job.
- Calculating overtime pay; gross weekly earnings.
- Commissions; salary plus commissions.
- Pay Cheque deductions - CPP; U.I.C.; I.T.
- Take Home Pay.

Unit 7 SAVING AND INTEREST

- Operations with Decimals, %
- Opening a savings account and using it.
- Deposits and cheques.
- Monthly bank statement.
- Simple Interest earned on money invested.
- Simple Interest paid on money borrowed.
- Monthly interest.
- Cost of Loan.
- Installments and Amortizing.
- Compound Interest.

Unit 8 LOANS AND CREDIT

- Operations with decimals and %; reading statistical tables.
- Sources of Loans.
- Cost of borrowing; monthly payments.
- Using amortization tables.
- Mortgages.
- Credit Cards.
- Traveller's cheques.

Unit 9 INSURANCE

- Basic operations with decimals; reading tables.
- Automobile insurance - rates, types, costs.
- Life Insurance - Mortality tables, premiums, cash surrender value.
- Home insurance - fire insurance rates.

In addition to the above Units, there are also three "extra" units included in the Appendix:

*Unit A: BASIC SKILLS YOU NEED

*Unit B: MEASUREMENT SKILLS YOU NEED

*Unit C: COMPUTING SKILLS YOU NEED

These should be used where necessary.

Note Teachers will have to supplement the above material with a basic section on Algebra as written in the Math 25 Course Outline, Alberta Education 1982.

If you have chosen "CONSUMER AND CAREER MATH" as your text for Math 25, the following is a suggested outline that correlates the Math 25 Course Outline, Alberta Education, 1982, with text.

NOTE: The topics that are starred (*) could be considered as optional material.

CORE MATERIAL

Unit 1 MATHEMATICS SKILLS

Chapter 1 - Whole Numbers, Decimals & Fractions
N.B. - Integers not covered.

Chapter 2 - Equations, Proportions & Percent

Chapter 3 - Measurement & Statistics
*Review, Metric Measures
- Bar Graphs, Line Graphs, Circle Graphs
- Mean, Median Mode

Unit 2 INCOME BANKING AND CREDIT

Chapter 4 - Income

*Chapter 5 - Personal Banking

Chapter 6 - Consumer Credit

Unit 3 *Chapter 7 - Buying a Car

*Chapter 8 - Automobile Operating Expenses

*Chapter 9 - Travel

Unit 4 HOUSING

Chapter 10 - Renting and Decorating a Home
- Amount to Spend for Rent
- Selecting a Place
- Personal Property Insurance

Unit 5 TAXES, INSURANCE AND INVESTMENTS

Chapter 13 - Income Tax

Unit 6 PURCHASING AND BUDGETING

Chapter 16 - Buying Food

Chapter 16 - Buying, Making, and Renting Goods

Chapter 18 - Budgeting

ELECTIVE MATERIAL

Chapter 11 - Buying a Home

Chapter 12 - Building a Home

Chapter 14 - Health, Life and Retirement Insurance

Chapter 15 - Investments

Additional Video Resource - Mathematics 15-25

MATHWISE Television Series

MATHWISE is a series of 12 television programs designed to teach four modules: measuring, comparing, locating/interpreting and predicting to grade nine and ten students. Each program includes a documentary and dramatic segment. The documentaries introduce the math skills and illustrate their use in everyday situations and the dramatic segments show students using the same skills to solve problems. A teacher's guide is also available.

MATHWISE was produced by the Agency for Instructional Television, a consortium of 23 state and provincial agencies from Canada and the United States.

MATHWISE is available through the ACCESS Media Resource Centre, Health Science Centre, 3350 Hospital Drive, N.W., Calgary, Alberta, T2N 4N1. Phone 283-8241.

Strategies of Problem Solving

In the teaching/learning of problem solving, an instructional approach should be used which helps students learn and choose procedures for solving problems. These procedures are easy to state and recognize, but they are often quite elusive when teaching. Difficulty frequently exists when teaching problem solving because, unlike the teaching of computational skills or concepts, there is no specific content involved. In problem solving, an individually acquired set of processes is brought to bear on a situation that confronts the individual.

There are generally four procedures (steps) which appear inherent in problem solving. These procedures, their descriptions and associated strategies have been compiled and adapted from a variety of sources and authors (George Polya, J.F. LeBlanc, Ohio Department of Education, Math Resource Project, 1980, NCTM Yearbook) and are listed below:

STEPS IN PROBLEM SOLVING

1) UNDERSTAND THE PROBLEM

What is the problem? What are you trying to find? What is happening? What are you asked to do?

Suggested Strategies:

- Paraphrase the problem or question (Restate the problem in your own words to internalize what the problem entails.)
- Identify wanted, given and needed information (Helps students focus on what is yet to be determined from problem statement as well as listing information so that they may better be able to discover a relationship between what is known and what is required.)
- Make a drawing (May help to depict the information of a problem, especially situations involving geometric ideas.)
- Act it out (Helps to picture how the problem actions occur and how they are related thereby giving a better understanding of the problem.)
- Check for hidden assumptions (What precisely does the problem say or not say? Are you assuming something that may not be implied? Beware of mistaken inferences.)

2) DEVISE A PLAN TO SOLVE THE PROBLEM

What operations should you use? What do you need to do to solve the problem? How can you obtain more information or data to seek the solution?

Suggested Strategies:

- Solve a simpler (or similar) problem (Momentarily set aside the original problem to work on a simpler or similar case. Hopefully the relationship of the simpler problem will point to the solution for the original problem.)
- Construct a table (Organizing data in tabular form makes it easier to establish patterns and to identify information which is missing.)
- Look for a pattern or trend (Does a pattern continue or exist? In connection with the use of a table, graph, etc., patterns or trends may be more apparent.)
- Solve part of the problem (Sometimes a series of actions each dependent upon the preceding one, is required to reach a solution. Similarly it may be that certain initial actions will either produce a solution or uncover additional information to simplify the task of solving the problem.)
- Make a graph or numberline (May help organize information in such a way that it makes the relationship between given information and desired solution more apparent.)
- Make a diagram or model (When using the model strategy attempt to select objects or actions to model those from the actual problem that represents the situation accurately and enables you to relate the simplified problem to the actual problem. May be used in connection with, or in place of other similar strategies, i.e., acting out the problem.)
- Guess and check (Guessing for a solution should not be associated with aimless casting about for an answer. The key element to this strategy is the "and check" when the problem solver checks his guesses against the problem conditions to determine how to improve his guess. This process is repeated until the answer appears reasonable. An advantage of this "guess and check" strategy is that it gets the individual involved in finding a solution by establishing a starting point from which he can progress. Used constructively with a table or graph this strategy may be a valuable tool.)

- Work backwards (Frequently, problems are posed in which the final conditions of an action are given and a condition is asked for which occurred earlier or which caused the final outcome. Under these circumstances working backwards may be valuable.)
- Change your point of view (Some problems require a different point of view to be taken. Often one tends to have a "mind set" or certain perspective of the problem which creates a difficulty in discovering a solution. Frequently, if the first plan adopted is not successful, the tendency is to return to the same point of view and adopt a new plan. This may be productive, but might also result in continuous failure to obtain a solution. Attempt to discard previous notions of the problem and try to redefine the problem in a completely different way.)
- Write an open sentence or equation (Often in conjunction with other strategies - using a table, diagram, etc., one selects appropriate notation and attempts to represent a relationship between given and sought information in an open sentence.)

3) CARRY OUT THE PLAN

For some students the strategy/strategies selected may not lend itself/themselves to a solution. If the plan does not work, the problem solver should revise the plan, review step 1, and/or try another plan or combination of plans from step 2.

4) LOOK BACK AT THE STEPS TAKEN (Consolidating Gains)

Is the result reasonable and correct? Is there another method of solution? Is there another solution? Is obtaining the answer the end of the problem?

- Generalize (Obtaining an answer is not necessarily the end of a problem. Re-examination of the problem, the result and the way it was obtained will frequently generate insights far more significant than the answer to the specific situation. It may enable the student to solve whole classes of similar and even more difficult problems.)

- Check the solution (The very length of a problem or the fact that symbolic notation is used may tend to make one lose sight of the original problem. Does the answer appear reasonable, does it satisfy all the problem requirements?)
- Find another way to solve it (Can you find a better way to confront and deal with the problem? The goal of problem solving is to study the processes that lead to solutions to problems. Once a solution is discovered, search the problem for further insights and unsuspected ideas and relationships.)
- Find another solution (Students tend to approach many problem situations with the expectation of only one correct solution. In many practical, daily life situations there may be many answers that are correct and acceptable.)
- Study the solution process (Studying the process of solution makes the activity of problem solving more than answer-getting and can expand an individual problem into a meaningful total view of a family of related problems.)

It must be noted that the 4 steps of the above model are not necessarily discreet. For example, one may move without notice into step 2 while attempting to generate more information to understand the problem better.

If the 4-step model is used, the key is to select an appropriate strategy or strategies to help answer the questions suggested by each step. The strategies listed, and those devised by students will hopefully alter the problem information, organize it, expand it, and make it more easily understood. Strategies then may be thought of as the tools of problem solving and the 4-step model, the blueprint.

Suggested Strategies for Math 25 Life Skills Unit

Attempt to give the student practical applications of money management skills by taking the student through the next 5 to 7 years of his/her life.

Four experiences are suggested:

1. As a grade 11 student, with or without a part-time job during the school term. The student must apply for and be successful in getting a job with a fictitious company set up for this purpose. If possible have the student file a written application form and then conduct a personal interview with him or her re the application. Once the student has successfully obtained the job; he must carry out several math calculations re his total salary earned, his total deductions etc., and then file a T-1 Income Tax Return for the year based on this information.
2. As a grade 12 student still living at home. Once again, he may or may not have a part-time job, but is rehired by the same company (at a raise in basic pay), in the same job for the summer. At this stage, it would be a good idea to introduce budgeting because the student is now required to pay for his own clothes, gas for transportation, and contribute towards household expenses by paying a small monthly rental to his parents. Once again he must file an Income Tax return.
3. As a full-time employee out on his own. The student now goes out into the world of work, employed full time; no longer living at home; probably purchasing and paying for a car (remember to account for all operating expenses); buying food, clothes, etc. This could represent the student's first year of an apprenticeship program, or just a year of working prior to attending NAIT, SAIT, or other post-secondary institutions.

The student must keep in mind his/her long-range goals and be working towards them. Once again, the student must complete a budget and file an Income Tax Return for the year. Note: He may be eligible for Alberta Rental Assistance, etc.

It is very important at this stage that all the student's calculations be realistic. The job he has must pay a realistic wage, based upon current earnings. Make him check his calculations and determine that they are realistic (i.e. Where is he renting? Does he pay for phone, utilities, etc?). Food budgets - make him find out what it costs per week to shop for groceries, etc.

4. As a person who has completed his job training (i.e. he has achieved his Long Range Goal as far as education or job training is concerned), he is now employed as a teacher or plumber, or hairdresser at the basic starting rate for that particular position. In addition to this, the student is now married (with a non-working spouse) and has at least one or perhaps as many as three dependents (give name(s) and age(s)).

What does it really cost to live in Alberta and raise a family?
Can it be done on a salary of \$1,000. per month?

Student goes through all the same calculations as before - Family Budget (very critical here), Summary of Finances, and Individual Income Tax Return. Student must be constantly reminded that he is NOT shopping for and budgeting for one person only, but for the WHOLE FAMILY -- very difficult concept for him to grasp, but most worthwhile exercise.

NOTE: In all cases, the student must BALANCE his BUDGET and at least attempt to save towards LONG RANGE GOALS.

If time permitted, a FIFTH STAGE could be undertaken - purchasing first home, etc.

Additional Suggestions

The Life Skills experience can be made into a game -- use dice or a spinner to determine wages, hours worked, total weeks worked, number of dependents, etc.

METRICATION POLICY

It is the policy of Alberta Education that:

1. SI units become the principal system of measurement in the curriculum of the schools in the province;
2. the change to the use of SI units in schools be such that the instructional programs are predominantly metric by June, 1978;
3. changes in the curriculum of individual schools proceed in concert with corresponding changes in industry and commerce;
4. selected consultative and in-service resources be made available to teachers for professional preparation in the integration of SI units in their instructional programs;
5. conversion of the schools to the metric system (SI) be carried out on a pre-planned basis with a gradual replacement and/or modification of measurement-sensitive resources;
6. conversion costs will generally be borne by the responsibility centre incurring them;
7. conversion will be accomplished by means of existing administrative structures, and there will be only a minimum number of short-term special purpose assignments associated with the change to SI.

EXPLICATION OF THE METRICATION POLICY

1. . . . that SI units become the principal system of measurement in the curriculum of the schools in the province;
- 1.1 As part of a world-wide movement to standardize commonly used elements of trade, Canada has committed itself to the use of SI units by the early 1980's. It is already evident that many sections of our society which use measures will be predominantly metric before 1980.

It has become imperative that the school curriculum prepare students to cope with metric measures in all facets of their life. In addition many students will require a detailed knowledge of more specialized units used in specific career fields.
- 1.2 Some imperial units will be in use for some time; therefore as teachers introduce SI they are

expected to retain selected reference to imperial units. This teaching of specific imperial units should be related only to those that are relevant to student needs and should be kept to a minimum. Mathematical conversions from one system to the other are to be avoided wherever possible.

- 1.3 Resource materials for the classroom should use SI units as the principal measuring system with only such references to the imperial or "old" metric systems as are unavoidable.
2. . . . that the change to the use of SI units in schools be such that the instructional programs are predominantly metric by June, 1978.
- 2.1 In a predominantly metric program the student, depending upon age and ability, is familiar with the appropriate metric units of length, area, volume, mass and temperature, and uses these units in school for making and expressing measurements in all areas of the curriculum.
- 2.2 The date (June, 1978) is a general target by which it is expected that curriculum guides and programs of studies and the various acts and regulations will have been changed to reflect the new measurement language. Most schools will have begun the transition of their classroom programs by June, 1978; indeed many schools will have completed the change before this date.
- 2.3 It is entirely possible that some of the high school technical and vocational programs will have a need to continue teaching the use of imperial units. It may take a specific technological area some considerable time to make the change, especially one that uses machinery with a long working life.
- 2.4 The correct usage of the SI units will be directed by the **Metric Practice Guide** (CSA Z234.1 - 1973) or the **Metric Style Guide** (Council of Ministers of Education, Canada). A copy of the **Metric Style Guide** has been made available to each teacher (in English or French).
3. . . . that changes in the curriculum of individual schools proceed in concert with corresponding changes in industry and commerce.
- 3.1 The Canadian Metric Commission under the federal Ministry of Industry, Trade and Commerce has been coordinating the change to metrics since 1970. Timelines and metrication dates have been established for many sectors of the economy. Educators should keep themselves informed as to progress in both the

- technical areas in which they may be teaching and the activities occurring in the community.
- 3.2 The Department of Education will attempt to keep schools informed regarding progress in the use of metric units.
- 4 . . . *that selected consultative and inservice resources be made available to teachers for professional preparation in the integration of SI units in their instructional programs.*
- 4.1 Achieving metric conversion by the target date is dependent upon many factors, not the least of which is the whole-hearted cooperation by educators in carrying out their assigned roles. In preparing teachers and administrators to better cope with the changes, the Department of Education will provide consultative and inservice resources through the Regional Offices in Grande Prairie, Edmonton, Red Deer, Calgary and Lethbridge.
- 4.2 The staff of a school should plan co-operatively to bring a unified approach to the teaching and use of measurement. Metrication goes beyond the formal content of the curriculum. The changeover with its many implications will affect everyone associated with the process of education.
- 4.3 Since measurement is an activity related process, it follows that individuals — teachers as well as students — learn the metric units while measuring. That is, some degree of active involvement in measuring or in using the units that one is learning.
- 4.4 Very few people will have to know the entire metric system. That is, when presenting SI, one should only attempt to deal with that part of the system which is necessary for the task at hand.
- 5 . . . *that conversion of school programs to SI be carried out on a pre-planned basis with a gradual replacement and/or modification of measurement-sensitive resources.*
- 5.1 Most measurement-sensitive devices will have to be replaced over the next few years. Items ranging from inexpensive rulers to costly metal lathes will have to be either replaced or modified. Exactly when and how much modification versus replacement occurs depends upon the economics. For a machine that is near the end of its useful life, any modifications will have to be minimal. For a nearly new machine a scale replacement or recalibration may be the best course of action. In any event, common sense must prevail.
- 5.2 Any new acquisitions of machines or tools should be those with metric capabilities. In spite of the best planning and careful budgeting, there is bound to be some frustration as suppliers fail to deliver as promised and as people do not respond as predicted.
- 6 . . . *that conversion costs will generally be borne by the responsibility centre incurring them.*
- 6.1 The term "responsibility centre" is meant to refer to those parts of the administrative structure which are responsible for budgeting and purchasing services, materials, and equipment for schools.
- 6.2 By placing responsibility for costs as close as possible to the actual use of goods or services, it is hoped that there will be a greater accountability in the changing over to metrics.
- 6.3 Implicit in this policy is the idea that those exercising responsibility will do so with restraint.
- 7 . . . *that conversion will be accomplished by means of existing administrative structures, and there will only be a minimum number of short-term special-purpose assignments associated with the change to SI.*
- 7.1 In other words, as far as is possible, there will be only temporary positions associated with metrication. In addition, administrative costs are to be kept as low as possible, with the additional work load being handled on a contract or short-term assignment basis. In this way, it is hoped that the money spent on metrication will have maximum effect on the classroom.

Recommendations for School Mathematics of the 1980s

THE NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS

The National Council of Teachers of Mathematics recommends that —

1. problem solving be the focus of school mathematics in the 1980s;
2. basic skills in mathematics be defined to encompass more than computational facility;
3. mathematics programs take full advantage of the power of calculators and computers at all grade levels;
4. stringent standards of both effectiveness and efficiency be applied to the teaching of mathematics;
5. the success of mathematics programs and student learning be evaluated by a wider range of measures than conventional testing;
6. more mathematics study be required for all students and a flexible curriculum with a greater range of options be designed to accommodate the diverse needs of the student population;
7. mathematics teachers demand of themselves and their colleagues a high level of professionalism;
8. public support for mathematics instruction be raised to a level commensurate with the importance of mathematical understanding to individuals and society.

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